

Paper

Are Alcohol-Related Acute Surgical Admission Rates Falling?

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ABSTRACT:

Background: Alcohol-related admissions (ARA) represent a significant burden on hospital resources. The study objectives were to assess alcohol-related acute surgical admissions to a District General Hospital over a 5-year period, to determine the cost of these admissions and to consider strategies to affect future admission rates.

Methods: A prospective observational study was completed from October 2007 to March 2008. A daily review of acute surgical admissions determined whether alcohol was a factor for patients admitted. Data recorded included patient demographics, clinical presentation, investigations and final outcomes. This data was then compared with a previously completed prospective study between November 2002 and March 2003.

Results: Overall emergency surgical admissions during the study period were 1,125 (10.4%) compared to 838 (11.02%) in 2002. There was a 1.1% reduction in ARA from 9.5% (80/838) in 2002 to 8.4% (94/1,125) in 2007. The majority of ARA were male (82.8%) and 59.8% of ARA were under 40 years of age. ARA secondary to road traffic collisions (RTC) were reduced in 2007 compared to 2002 (12.5% to 8.5%). However, head injuries (30.0% to 48.9%) and pancreatitis (3.8% to 19.1%) secondary to alcohol had increased ($p=0.27$). 79.3% of admissions occurred out of hours. Although use of plain x-rays had decreased (70% to 54.3%, $p=0.018$), CT imaging (11.3% to 20.2%, $p=0.67$) and upper GI endoscopy had increased (2.5% to 7.4%, $p=0.82$). Blood alcohol levels increased with 83.0% of patients in 2007 compared to 60.9% in 2002 admitted with a level greater than 151mg/100mls ($p=0.10$). The overall cost of ARA over one year was calculated at £341,796.

Conclusion: Alcohol-related admissions have reduced at this District General Hospital. However, despite recent government initiatives it still remains unclear how these factors affected ARA, as blood alcohol levels, alcohol-related head injuries and pancreatitis admissions all increased. Our findings highlight the relevance of the implementation of an inpatient alcohol policy combined with the availability of an alcohol liaison nurse in all acute surgical units.

INTRODUCTION

Alcohol-related problems are commonplace in society and pose significant resource implications for their management by healthcare providers^{1,2}. In the emergency setting, alcohol remains a major factor for many hospital attendances ranging from simple accidents to violence and assault, major trauma and the sequelae of acute end-organ failure^{3,4}.

Within the National Health Service (NHS), the effects of alcohol have become a significant resource and financial burden accounting for over 811,000 admissions to NHS hospitals in England alone in 2006/2007 – a rise of more than 15% annually⁵. These figures were mirrored in Ireland where there were 133,962 alcohol-related admissions (ARA), which accounted for 841,161 bed days, over a 10-year period from 1995-2004⁶. Indeed the age standardised rate of ARA in the Irish population increased by almost 60% from 144.3 to 238.3 per 100,000 people between 1997 and 2001⁶. Over a similar time period the National Cancer Registry reported that liver cancer had the greatest increase in occurrence compared to other cancers with a 7.4% and 10.7% increase in males and females respectively⁷. Within the NHS, it is estimated that 1 in 16 hospital admissions are alcohol-related and that alcohol-related diseases account for 1 in 8 bed days (approx. 2 million), 1 in 8 day cases (approx. 40,000 cases),

and up to 35% of all accident and emergency attendances⁸. The estimated annual cost of alcohol misuse to the NHS in 2006/2007 was approximately £2.7 billion⁹.

Recent reports suggest that ARA account for between 7% and 11% of all surgical admissions^{1,10}. ARA rates vary according to the type of hospital (tertiary or district general) and location (urban or rural). Trauma associated with alcohol tends to involve more severe injuries, necessitating longer hospitalisation¹¹. Williams *et al* (1994) assessed alcohol-related head injuries and identified that 3.2% had a delay in discharge due to alcohol withdrawal¹². These factors have direct implications for patient care and service provision.

Government initiatives to curb alcohol-related problems include local and national strategies to target pro-alcohol influences. Dring and Hope (2001) assessed the impact of advertising alcohol products on a teenage population in Ireland and identified that alcohol adverts appeared to be targeted at this population, where alcohol consumption was

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associated with social and sexual success¹³. A report from the Academy of Medical Sciences (2004) identified a direct correlation between the level of expenditure on alcohol advertising and alcohol consumption between 11-15 year olds in the UK¹⁴. This prompted a revision of alcohol advertising rules in 2005 whereby alcohol advertising must not appeal to those under 18-years of age and should not imply social or sexual success or glamourise over consumption of alcohol and anti-social behaviour¹⁵. Similar rules have been enforced in Ireland since 2007.

Within Northern Ireland, the government has introduced a "New strategic direction for alcohol and drugs 2006-2011". The aim of this policy was to improve community based services for people with alcohol and drug problems; to provide better education about alcohol for young people; and to implement better enforcement of current legislation¹⁶. A UK and Ireland wide consultation is also ongoing regarding the possibility of lowering the legal blood alcohol limit for driving from 80 mgs to 50 mgs of alcohol per 100 mls of blood which has been estimated to potentially save up to 50 lives and up to 1,500 injuries per year¹⁷.

OBJECTIVE

The aim of this study was to assess alcohol-related acute surgical admissions in a District General Hospital and to compare patient demographics, admission aetiology, clinical presentation, and surgical outcome between two different time periods. We then evaluated the financial implications these admissions placed on our unit, the possible treatment course, future patient management options, and whether recent changes in government policy have affected the trend of these alcohol related admissions within our unit compared to national and international reports. This was possible as at the time of both studies there were no hospital-based alcohol policies within Daisy Hill Hospital.

METHODS

A prospective observational study was completed over an 18-week period from 29th October 2007 to 1st March 2008. All acute patients admitted surgically over this period were included and details of those admitted with alcohol-related problems were recorded. Alcohol-related admissions were identified through history, clinical signs, and blood alcohol levels and defined as any person admitted with a condition that was attributable to alcohol. They were then divided broadly within four categories: 1) patients in whom alcohol was the primary reason for admission, e.g. head injury while intoxicated; 2) patients in whom alcohol was the secondary reason for admission, e.g. road traffic collision caused by drunk driving or an assault by a drunk assailant; 3) known alcoholics who were admitted to the surgical ward with chronic alcohol related disease such as pancreatitis; and 4) known alcoholics who were admitted to the surgical ward for social reasons. A review of the patient discharge system using the keyword "alcohol" was also completed at the end of this period to ensure that all patients had been identified.

Demographical data, date of admission, diagnosis, blood alcohol level, in-patient investigations, date of discharge, and the number of previous alcohol-related admissions were recorded. All aspects of patient data were collected in tandem by two members of the surgical team to facilitate concordance

with admission aetiology. A prospective study had been previously completed using similar methodology over a 13-week period from 29th November 2002 to 1st March 2003. The results of each study were then compared to published national and international data to enable trend comparison.

A cost analysis for all patient admissions was performed using data provided by *The Southern Hospitals Trust Finance Directorate* using costings from the 2001-2002 and 2005-2006 financial years respectively. The stated cost per admission was based on medical, nursing, administrative, as well as miscellaneous overheads and expenses. However, these figures did not include the cost of additional investigative modalities. The overall cost of an ARA per day was therefore calculated at £328.28 for 2002-2003 and £469.50 for 2006-2007.

Recent national government policy decisions were accessed through The Department of Health, the Office of Communications, and the Cabinet Office websites while local policy decisions were accessed through The Department of Health, Social Services, and Public Safety Northern Ireland website^{5,8,9,15,16}. National trends in alcohol use including policy papers were accessed through The Institute of Alcohol Studies, The National Cancer Registry Ireland, and the NHS Information Centre websites^{7,17-19}. Other relevant articles and papers were accessed through Pubmed using keywords acute, alcohol, cost and surgery.

STATISTICAL ANALYSIS:

Descriptive statistics for baseline variables such as patient demographics were calculated as the mean and standard error of the mean (SEM) or the median and interquartile ranges (IQR). The independent samples T-Test was used to compare differences between the two time periods. All statistical tests were 2-sided and differences were considered significant if the p-value was <0.05. Statistical analysis was performed using the SPSS statistical package (Version 12 SPSS®inc. Chicago, USA).

RESULTS

Patient Demographics

There were a total of 10,810 attendances at the accident and emergency (A&E) department over the 18-week period between October 29th 2007 and 1st March 2008, which was a 2.5% increase on the 13-week period for 2002/2003 (a total of 7,602 attendances at A&E between November 29th 2002 and 1st March 2003). There were a total of 838 admissions in the first study period and 1,125 admissions during the second. In the 2002 period, 80 (9.5%) emergency admissions to the general surgical ward were related to alcohol whilst in the 2007 period, 94 (8.4%) were related to alcohol (**Table 1**). With regard to overall attendances at A&E, 11.02% were surgical admissions in 2002 with 1.05% being alcohol-related, which compared to 10.40% in 2007 with 0.87% being alcohol-related.

Of the 80 patients admitted in 2002, 62 (77.5%) were male which compared with 82 (87.2%) male in 2007. The median age was 37.3 years in 2002 (range 14-79) and 38.4 years (range 18-78) in 2007. 50 (62.5%) patients were under 40 years and 30 (37.5%) over 40 years in 2002, which compared with 54 (57.5%) patients under 40 years and 40 (42.5%) over 40 years in 2007 (Figure 1).

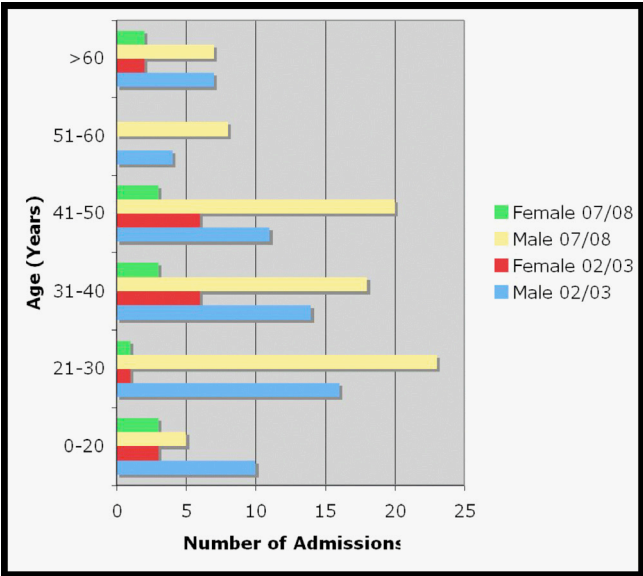


Fig 1. Patient age range vs. gender in all acute surgical admissions where alcohol was a predisposing factor to admission.

The majority of admissions occurred out-of-hours, which was defined as any admission between the hours of 5pm and 9am Monday to Friday and all of Saturday and Sunday. In the 2002 period, 40.0% of admissions occurred on Saturday and Sunday as compared with 47.8% of admissions in the 2007 period. During the 2002 period, there were 12 admissions (15.0%) between 9am-5pm Monday to Friday while 65 admissions (81.3%) were out-of-hours. This compared with the 2007 period, during which time 20 admissions (21.3%) were between 9am-5pm Monday to Friday and 73 admissions (77.7%) were out of hours. In particular, 29.8% of admissions occurred on a Sunday in the 2007 period (22.5% in the 2002 period) and the most common time overall for admissions was between 12am and 4am – 33.8% in 2002 and 25.5% in 2007. The time of admission was not documented for one patient in 2007 and for three patients in 2002 (Figure 2).

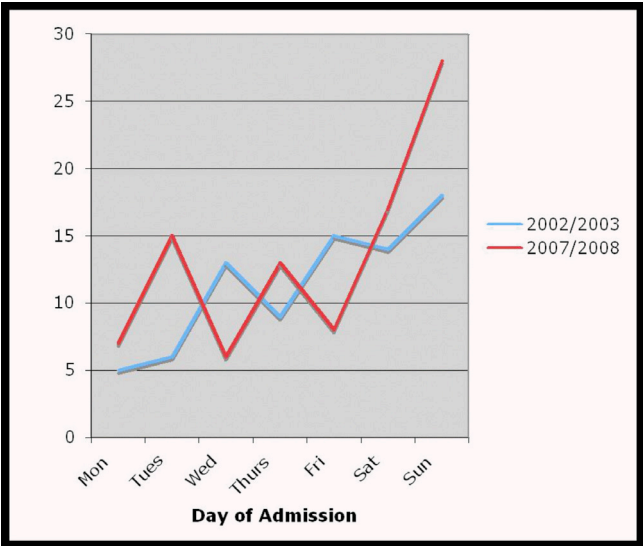


Fig 2. A breakdown of the day of admission in all acute surgical admissions where alcohol was a predisposing factor.

The number of admissions in category 1 had increased

between 2002 and 2007 from 30 (37.5%) to 55 (58.5%) patients respectively. However, ARA from category 2 had reduced from 21 (26.3%) to 9 (9.6%) patients, while ARA from category 3 remained static (29 to 30 patients) (p=0.064). There were no admissions in Category 4 during either period (Table 1).

TABLE 1
Comparison of total number of surgical admissions and alcohol related admissions in 2002-2003 vs. 2007-2008.

	2002-2003	2007-2008
Total number of surgical admissions	838 (770 patients)	1,125 (1,049 patients)
Total number of admissions related to alcohol	80 (9.5%)	94 (8.4%)
Category 1	30 (37.5%)	55 (58.5%)
Category 2	21 (26.25%)	9 (9.6%)
Category 3	29 (36.25%)	30 (31.9%)
Category 4	0 (0%)	0 (0%)
Average number of admissions per month	27	24
Average number of admissions per week	7	5.2

The majority of patients were admitted following a head injury (24 vs. 46). Pancreatitis increased from 3 patients in 2002 to 18 in 2007. In contrast, the level of ARA with generalised abdominal pain, fractures, and as a consequence of road traffic collisions (RTCs) decreased. The decrease in ARA following RTCs is particularly pertinent as it represented a reduction from 12.5% (n=10) in 2002 to 8.5% (n=8) in 2007. However, these shifts in admission aetiology were not statistically significant between the two time points (p=0.27) (Table 2).

Although the use of plain x-rays had reduced from 70.0%

TABLE 2
The diagnosis on discharge of patients admitted to the surgical ward with an alcohol related admission.

DIAGNOSIS	2002-2003	2007-2008
Head Injury	24 (30.0%)	46 (48.9%)
Abdominal Pain	16 (20.0%)	1 (1.0%)
Fracture	8 (10.0%)	6 (6.4%)
Epigastric Pain	6 (7.5%)	0 (0%)
Laceration (not head)	4 (5.0%)	1 (1.0%)
Pancreatitis	3 (3.8%)	18 (19.1%)
Liver Cirrhosis	3 (3.8%)	0 (0%)
Haematemesis	3 (3.8%)	0 (0%)
Other	13 (16.3%)	22 (23.4%)

TABLE 3

The number and type of investigations performed on alcohol related acute surgical admissions during 2002-2003 vs. 2007-2008.

INVESTIGATION	2002-2003	2007-2008
X-ray	56 (70.0%)	51 (54.3%)
Computed Tomography (CT) Scan	9 (11.3%)	19 (20.2%)
Ultrasound	8 (10.0%)	13 (13.8%)
Oesophageogastroduodenoscopy (OGD)	2 (2.5%)	7 (7.4%)
Full Blood Count (FBC)	48 (60.0%)	74 (78.7%)
Urea & Electrolytes (U+E)	48 (60.0%)	79 (84.0%)
Liver Function Tests (LFTs)	23 (28.8%)	55 (58.5%)
Coagulation	14 (17.5%)	23 (24.5%)
Other	35 (43.8%)	65 (69.1%)

to 54.3% ($p=0.018$), a corresponding increase in computed tomography scans had occurred between the two time points (11.3% to 20.2%, $p=0.67$). Upper gastrointestinal endoscopies increased with 7 performed in 2007 compared to 2 in 2002 ($p=0.82$) (Table 3). During the 2002 period, 46 patients (57.5% of admissions) had their blood alcohol level checked and 28 of these patients had a blood alcohol level greater than 151 mg of alcohol/100 mls. The highest level detected was 449 mg of alcohol/100 mls. In the 2007 period, 53 patients (56.4% of admissions) had their blood alcohol level checked and 44 patients had a level greater than 151 mg of alcohol/100 mls. The highest level detected was 411 mg of alcohol/100 mls (Figure 3). These figures represent an increase in elevated blood alcohol levels with 83.0% of patients admitted with a level greater than 151 mg of alcohol/100mls in 2007 compared to 60.9% in 2002 ($p=0.10$).

55.0% of patients were discharged within 24 hours after admission in 2002 compared to 51.0% in 2007. However, 7.5% ($n=6$) of patients remained in hospital for greater than 7 days after admission in 2002, which is comparable to a 9.6% ($n=9$) rate in 2007. An increase in recurrent admissions was demonstrated in both time points where 31.3% and 42.6% of admissions were recurrent for the 2002 and 2007 time periods respectively.

FINANCIAL IMPLICATIONS

The average bed day cost in 2001/2002 was £328.28. During the 13-week period assessed in 2002-2003 the total cost of alcohol-related surgical admissions based on these figures was £69,923.64. This extrapolates to £279,695 over a period of one year. In 2005/2006, the cost of a general surgical bed day had increased to £469.50. During the 18-week period assessed in 2007-2008 the total cost of alcohol-related surgical admissions based on these figures was £118,314.00. This extrapolates to £341,796 over a period of one year and an annual increase of £62,101 compared to 2002. This figure is for bed days only and does not include the cost of the numerous investigations or therapeutic procedures performed on ARAs.

DISCUSSION

In Canada, ARA account for over 1.2 million hospital days in acute care at a cost of nearly Can\$1.5 billion in 2002². Lost productivity due to alcohol was also estimated as Can\$7 billion per year with the cost to Irish business estimated at €1.5 billion per year^{20, 21}. The fall of 1.1% in ARA in this study stands in contrast with reports from England, which report a 15% increase in ARA in 2006/2007 accounting for over 811,000 patient episodes⁵. More recent data from England documents a doubling of ARA over the last 10-years¹⁸. These figures correlate with experiences in Ireland where alcohol-related discharges increased by 92% between 1995 and 2002⁶.

Previously, Taylor *et al* (1986) found that 70% of alcohol related admissions were male^{1,22,23}. We identified a similar male predominance for ARA of 82.8%. A younger patient age was also shown to be an important factor where Taylor *et al* (1986) identified that 42% of their male admissions were aged 40 years or less¹. In our study, 48.9% of male admissions were aged 40 years or less, implying similar epidemiological trends previously identified in 1986. This data highlights the target population for possible intervention but also the failure in the intervening period to accomplish positive change amongst this age group.

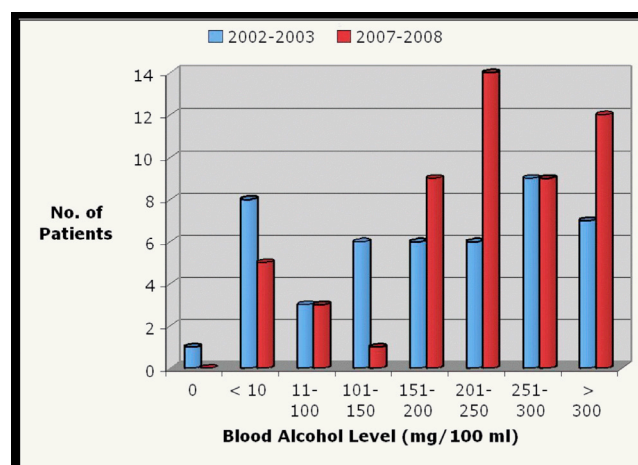


Fig 3. Blood alcohol levels on acute surgical admissions where alcohol was a predisposing factor in 2002-2003 and 2007-2008.

Concerningly, a marked rise in primary ARA (category 1) was demonstrated between the two time periods. This contrasted with a fall in category 2 admissions while category 3 admissions remained almost static. There were no category 4 admissions during either time period. It is unclear why there was a fall in category 2 admissions. However, it was expected that category 3 admissions would remain static as chronic alcohol-related pathologies often have a lag-period before clinical presentation. The absence of category 4 admissions probably relates to alcohol-related social admissions being directed to the medical team.

Although an important reduction in ARA following RTC was demonstrated, most other conditions experienced an increase in ARA rates and this was against a backdrop of an 11% increase in attendances at the accident and emergency

department between the study periods. 48.9% of ARAs were now due to a head injury, an increase of 18.9% over the intervening 5-year period. As a district general surgical unit, Daisy Hill Hospital still manages head injury patients similar to other general surgical units within the UK and Ireland¹². Williams *et al* (1994) reported that 51.0% of head injury admissions to their acute general surgical ward in a central London teaching hospital were intoxicated. Following a similar increase over the last five years, our figures are now approaching this rate¹².

The incidence of alcohol-related pancreatitis increased dramatically over the 5-year period. This parallels O'Farrell *et al* (2007), who reported an increased incidence of acute pancreatitis from 17.5 per 100,000 population in 1997 to 23.6 per 100,000 population in 2004²⁴. This increase was associated with alcohol ingestion rather than biliary tract related conditions²⁴. Despite these shifts in admission aetiology between the time-periods, there was no actual statistical difference in condition rates between the time-periods ($p=0.27$).

A particularly worrying finding was the level of alcohol consumption. We identified that 83.0% of those patients admitted had a blood alcohol level greater than 151mg/100mls, representing a 22.1% increase from 60.9% from 2002. The National Audit Office recently reported that more than 10 million people in England are regularly drinking above the recommended guidelines²⁵. However, the influence of public health schemes has not affected those admitted to hospital. Indeed, the Statistics on Alcohol: England 2008 study found that while 69% of people in Great Britain had heard of the government's guidelines on alcohol consumption, only 40% knew the recommendations¹⁸. Therefore the delivery of such concepts for responsible alcohol consumption may require modification.

The influence of admission times highlighted a resource factor, where 79.3% of ARA occurred out-of-hours during periods of reduced staffing levels. Subsequent investigations for ARA required the use of non-resident on-call staff, particularly radiographers, where a greater cost combined with logistical absences following on-call periods further disrupted normal working patterns within that DGH department. This was especially relevant in 2007 where the number of CT imaging alone increased.

An important factor for the improvement of the hospital-patient relationship is a specialist alcohol liaison nurse²⁶. The Royal College of Physicians guidelines from 2001 recommend that each acute hospital should have appropriately trained staff available to assess and offer interventions to "drinkers" through a defined hospital strategy²⁶. This advice is further reinforced by the latest Department of Health guidance, which advocates the appointment of alcohol health workers in the acute hospital setting^{25, 27}. Current literature reports that men benefit most from such interventions and that those not directly seeking treatment actually derive the most benefit from treatment^{26, 28}. The Royal Liverpool University Hospital estimated that over an 18-month period, an alcohol liaison nurse had prevented 258 admissions to the hospital, covering the cost of her salary 10-times over²⁶. Similar reports from the United States showed that brief interventions such as a short discussion about the costs and benefits of drinking from the patient's point of view and providing information about the health risks, lead to a significant reduction in

future health care costs^{29, 30}. While previous reports have demonstrated a direct correlation between the increased price of alcohol and reduced consumption, our study did not assess patient related finances^{19, 31}.

While the alteration in the quantity of radiological and endoscopic investigative modalities reflect changes in clinical practice including the National Institute of Clinical Excellence (NICE) guidelines on head injuries, the resultant resource implications are significant and should be highlighted. It is unclear how other changes in clinical practice could have accounted for an increase in recurrent attenders or in the length of stay of alcohol related admissions. Consequently, this may be more likely related to the increased alcohol consumption of those that were admitted and possibly the absence of any hospital-based alcohol policy. However, an 18.9% increase in overall alcohol-related head injuries, a 15.3% increase in overall alcohol related pancreatitis, and a 22.1% increase in overall admissions with a blood alcohol level greater than 150mg/100mls of blood within a 5-year period despite local and national policy initiatives and with a significant cost burden must be emphasised. In addition, the steady increase in ARA throughout the NHS, which appear to be mirrored internationally, seem to highlight the fact that policy initiatives to date have been disjointed and only partially effective. Our aim is to highlight the significance of this problem to the general surgical ward, its burden on the surgical budget, and how simple measures such as the appointment of an alcohol liaison nurse and the institution of brief interventions by medical staff can be effective in reducing the future cost of ARA to the surgical unit.

At the time of study there were no hospital-based alcohol policies within Daisy Hill Hospital. However, throughout the time period studied, there were a number of both national and local changes that could have influenced some of our findings. The reduction in RTC secondary to alcohol could relate to road improvements in the locality that were instituted in the intervening 5-year period. The introduction of the smoking ban in April 2007 has been widely extolled as contributing to a reduction in alcohol consumption at licensed premises throughout Northern Ireland. However, there has been no alteration in local pub or nightclub closing times or a staggering of closing times as has occurred in some parts of England and Wales, and the local authority have not introduced a bus service or any other such policy initiative. It is also worth noting that extended GP opening hours had not been introduced at the time of this study and therefore could not have had any influence on the results. There have been no other local healthcare policy initiatives, such as the opening or closure of minor accident & emergency units that could have affected the study findings.

CONCLUSION

Alcohol represents a significant burden on the health service. Over the past 5-years there have been a number of policy initiatives to alter public behaviour and reduce its impact on the health service. Our study has suggested partial success with a reduction in admission rates, combined with lower rates of alcohol related road traffic collisions. However, we should not become complacent as primary alcohol-related admissions in younger patients, alcohol consumption levels and alcohol related recurrent admissions all increased at an additional cost to the health service over a 5-year period. Our findings highlight the relevance of the implementation of an

in-patient alcohol policy combined with the availability of an alcohol liaison nurse in all acute surgical units and suggest the need for further progressive public health initiatives.

The authors have no conflict of interest to declare

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